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Inventory of Sources With Emissions Greater Than 100 Tons/Year Subject to Organic Material Regulations in Metropolitan Boston AQCR

Engineering-Science, Inc., McLean, VA

Prepared for

Environmental Protection Agency, Boston, MA. Region I

Jul 79

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John R. Busik, and Peter Hagerty.

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In response to the Clean Air Act Amendments of 1977, the Metropolitan Boston AQCR has been designated as a nonattainment area for ozone. As a result, the Massachusetts Department of Environmental Quality Engineering must submit a revision of their State Implementation Plan (SIP) to the U.S. Environmental Protection Agency. The first step in preparing a SIP revision is to inventory the emission sources of the pollutant which is of concern. This report presents a discussion of the procedures followed by Engineering-Science in the inventory of the Boston AQCR VOC point sources. Specifically, Chapter 2 outlines the methodologies utilized in identifying and surveying potential sources. Chapter 3 gives an analysis of how the emissions levels were estimated. Chapter 4 shows a summary of the results from this study, and Chapter 5 presents an analysis of existing VOC regulations and their applicability to this study.

KEYWORDS: *Air pollution, *Ozone, *State implementation plans, *Air quality control regions, *Boston(Massachusetts), *Air pollution abatement.

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INVENTORY OF SOURCES WITH EMISSIONS GREATER THAN 100 TONS/YEAR SUBJECT TO ORGANIC MATERIAL REGULATIONS IN METROPOLITAN BOSTON AQCR

Prepared for

U. S. Environmental Protection Agency
Division of Stationary Source Enforcement
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Task Order 38

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1<

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TABLE OF CONTENTS

Chapter		Page
I	INTRODUCTION	I-1
II	SURVEYING METHODOLOGY	II-1
	Identifying Potential Sources	II-1
	Questionnaires	II-4
	Response and Recontacting	II-4
III	ANALYSIS OF EMISSION LEVELS	III-1
	Gasoline and Crude Oil Storage	III-3
	Gasoline Marketing	III-3
	Surface Coating	III-4
	Degreasing	III-4
	Actual and Potential Emissions	III-4
IV	SUMMARY OF EMISSIONS	IV-1
V	ANALYSIS OF VOC REGULATIONS	V-1
	Background	V-1
	Control Technology Guidelines	V-2
	Review of Boston AQCR Regulations	V-2
APPENDIX A	METRO BOSTON AQCR - VOC MAILING LIST	
APPENDIX B	SURVEY PACKAGE	
APPENDIX C	REFERENCES	

LIST OF TABLES

Table	Title	Page
II-1	Standard Industrial Classifications (SICs) and Emissions-per-Employee Associated with VOC Emissions	II-2
III-1	Common Chemicals and Their Densities	III-2
III-2	CTG Category Definitions of Coated Products	III-5
IV-1	Metropolitan Boston VOC Sources Greater than 100 tpy	IV-2
IV-2	Summary of Potential VOC Emissions	IV-15
IV-3	Summary of Actual VOC Emissions	IV-16
V-1	Schedule for Issuance of Guidelines for Sources of Volatile Organic Compounds	V-3

CHAPTER I

INTRODUCTION

In response to the Clean Air Act Amendments (CAAA) of 1977 the Metropolitan Boston AQCR has been designated as a nonattainment area for ozone. As a result, the Massachusetts Department of Environmental Quality Engineering (DEQE) must submmit a revision of their State Imlementation Plan (SIP) to the U. S. Environmental Protection Agency (EPA). The SIP revision must demonstrate attainment of the primary National Ambient Air Quality Standards (NAAQS) by 1982; however, in the case of ozone and carbon monoxide, Congress recognized the difficulty that areas with problems related to these two pollutants would have in demonstrating attainment by 1982. As a result the CAAA contain a provision for a five year extension to 1987 to enable the problem areas further time to comply. The revised plans are required by the CAAA to impose measures representing reasonable available control technology (RACT) on stationary sources and transportation strategies for mobile sources (such as inspection and maintenance). These levels of control must take cost and other factors into account.

The attainment of the oxidant NAAQS will be more difficult than attainment of the NAAQSs for other pollutants. No source emits oxidants. Rather, oxidants result from complex atmospheric photochemical reactions involving VOCs, oxides of nitrogen, and other compounds. The current control philosophy is to reduce oxidant concentrations by reducing emissions of two precursors: VOCs and oxides of nitrogen. VOC emission reduction is the primary element in this strategy. Since the 1977 Clean Air Act Amendments require a State Implementation Plan (SIP) revision for areas which have failed to attain an NAAQS, the SIP revision for the Metropolitan Boston AQCR will, doubtless, contain VOC emission reduction requirements.

The first step in preparing a SIP revision is to inventory the emission sources of the pollutant which is of concern. The Massachusetts Department of Environmental Quality Engineering (DEQE) and Region I of the EPA have embarked upon a comprehensive program to develop a SIP revision for attainment

3<

of the oxidant NAAQS in the Metropolitan Boston Intrastate AQCR. Engineering-Science (ES) assisted the DEQE in this effort by performing an inventory of the 100 tons per year and larger VOC point sources within the AQCR.

After ES completed this inventory of the sources in the Metropolitan Boston AQCR which have a potential emission rate of 100 tons per year or greater the information was used to update the Compliance Data System (CDS) files. This will enable DEQE and EPA to effectively track the compliance status of point sources and to plan enforcement activities.

This report presents a discussion of the procedures followed by ES in the inventory of the Boston AQCR VOC point sources. Specifically, Chapter II outlines the methodologies utilized in identifying and surveying potential sources. Chapter III gives an analysis of how the emissions levels were estimated. Chapter IV shows a summary of the results from this study, and Chapter V presents an analysis of existing VOC regulations and their applicability to this study.

CHAPTER II

SURVEYING METHODOLOGY

The most common technique used for gathering emission inventory data is probably the mail survey. The primary purpose of this mail survey was to obtain source and emission data by means of a questionnaire mailed to each facility. In order to conduct this type of data gathering operation efficiently, the facilities to be surveyed were identified; mailing lists prepared; questionnaires had to be designed, assembled and mailed; data handling procedures were prepared and organized; and response receiving systems established. The steps performed to accomplish these tasks are presented in the following discussion.

IDENTIFYING POTENTIAL SOURCES

A common problem in developing VOC inventories through the use of mail surveys is that there are a large number of potential VOC sources which would not normally be reported if the inventory effort were not specifically directed towards VOC emissions. As a result a number of data lists which provided potential sources were surveyed in an effort to identify all the applicable sources. These data lists include: (1) the existing emissions inventory in the National Emissions Data System (NEDS); (2) the current Compliance Data System (CDS) master file; (3) a listing from the Massachusetts Department of Employment Security (DES); and (4) the Dun and Bradstreet industrial directory. A common feature of each of these lists is that potential sources can be identified on the basis of their Standard Industrial Classificastion (SIC) codes. These lists can be used in coordination with Table II-1 to identify potential VOC sources. As can be seen from reviewing the table, types of sources of

TABLE II-1[1]

STANDARD INDUSTRIAL CLASSIFICATIONS (SICs) AND EMISSIONS-PER-EMPLOYEE ASSOCIATED WITH VOC EMISSIONS

GENERAL 2-DIGIT SIC CATEGORIES	SPECIFIC 4-DIGIT SIC CATEGORIES	EMISSION-PER-EMPLOYEE RANGES (tons/employee/yr)
20 Food	Alcoholic beverages (2085)	0.075
21 Tobacco	Not Surveyed	-
22 Textiles	Coatings (2295), Non-wovens (2297), Dyeing (2231)	0.563-0.89
23 Apparel	Not Surveyed	-
24 Lumber & wood	Finished product (2435), (2492)	0.024-0.07
25 Furniture & fixtures	SIC (2511), (2514), (2521), (2522), (25242	0.08 -0.24
26 Paper	Bags, box (2643), (2651), (2653), Coated papers (2641)	1.0 -1.25
27 Printing	Newspaper publishing (2711) Comm. printing (2751), (2754)	0.08 -0.5
28 Chemicals	Organic chemical mfg. (2821), (2823), (2861), Chemical coating (2851), Specialty chemicals (2842), Carbon black (2895)	0.32 -0.357
29 Petroleum	All companies	0.11 -2.12
30 Rubber, plastic	Footwear (3021), Plastics (3041), (3069)	0.16 -0.256
31 Leather	Mfg. shoes (3149), Bags (3161), Personal goods (3172), Leather refinishing (3111)	0.13
32 Stone, clay, etc.	Glass products (3221)	0.03 -0.092
33 Primary metal	Treating (3398), Tubing (3357)	0.10 -0.267

[1] From Procedures for the Preparation of Emission Inventories for Volatile Organic Compounds, Volume I (EPA-450/2-77-028).

TABLE II-1[1] (cont.)

STANDARD INDUSTRIAL CLASSIFICATIONS (SICs) AND
EMISSIONS-PER-EMPLOYEE ASSOCIATED WITH VOC EMISSIONS

GENERAL 2-DIGIT SIC CATEGORIES		SPECIFIC 4-DIGIT SIC CATEGORIES	EMISSION-PER-EMPLOYEE RANGES (tons/employee/yr)
34	Fab. metal	Screws (3451-2), Metal samplings (3469), Plating (3471), Tool mfg. (3423), (3429)	0.19 -0.281
35	Machinery	Industrial machines	0.03 -0.048
36	Elect. Machinery	Devices (3643), Semicond. (3674)	0.04 -0.07
37	Transpt. equip.	Boats (3732), Truck bodies (3711), (13, 14, 15)	0.11 -0.855
38	Instruments	Optical frames (3832) Precision instruments (3825)	0.04 -0.199
39	Misc. Mfg.	Jewelry (3914-15), Toys (3944), Writing instr. (3951,53)	0.07 -0.259
5171	Bulk terminals	All surveyed	-
7216	Dry cleaning	All surveyed	-

1 From Procedures for the Preparation of Emission Inventories for Volatile Organic Compounds, Volume I (EPA-450/2-77-028).

7<

VOC emissions are listed according to SIC. As a result potential VOC sources were identified by direct comparison of the SICs listed in Table II-1 with the industrial SIC listings.

After all the potential sources were identified further refinement was necessary to limit the facilities surveyed to those with potential emissions of 100 tons per year or greater. This reduction was accomplished by two means. The first was by reviewing the permit and registration files for information that was already available. The second method of limiting the survey was to estimate a plant's emissions by using the emission-per-employee figures which are listed in Table II-1. Since ranges are given for this estimate the higher end of the range was used. This practice served to estimate higher emissions which in turn placed a greater number of plants above the 100 ton per year cutoff level. In addition to these measures, the sources which DEQE had previously evaluated were omitted from the ES survey. A copy of the final mailing list is contained in Appendix A.

QUESTIONNNAIRES

The questionnaires utilized for this mail survey were designed principally by DEQE, with a few minor suggestions from Engineering-Science. A copy of the form is contained in Appendix B.

RESPONSE AND RECONTACTING

After the survey packages which consisted of cover letter, instructions and questionnaire, were labeled for each of the facilities on the mailing list the assemblage was mailed to each plant. In some cases a response was not received after a reasonable time lapse which necessitated recontacting nonresponding plants. Recontacting was also necesssary in cases where further information was needed to supplement the data that had been supplied on the returned questionnaire. Due to time constraints the recontacting was done by phone in lieu of attempting to remail another survey package. By the end of this study ES was able to obtain responses from approximately 90% of the facilities originally on the mailing list.

CHAPTER III

ANALYSIS OF EMISSION LEVELS

The method used for calculating the emissions from any particular source was greatly dependent on the amount of process information available. Where possible, emissions were estimated on a material balance basis using source data specifying quantities and physical properties of process constituents. If the quantities of process material and throughputs were provided by a source but the densities were not, emission levels were computed using physical properties from various chemistry and chemical engineering handbooks, or by using emission factors presented in EPA publication AP-42. A complete list of references can be found in Appendix C. If the specific data necessary for the above methods was unavailable, general information and engineering judgement governed the assumptions and resulting calculations. The general assumptions made during this study are as follows:

- o all solvents present in surface coatings being applied were assumed to evaporate completely;
- o water curtains, demisters, filters and other similar control devices were assumed to have no effect on VOC emissions;
- o densities and other physical properties were taken at 60-70°, where specific densities could not be found a value of 7.0 lb/gal was used;
- o emission factors in AP-42 and RACT documents were assumed the most reliable, a NEDS factor was used when no other factor was available; and
- o vapor recovery on loading racks was assumed to be 94.5% efficient.

Whenever the densities of process constituents were not provided on the returned questionnaire the values in Table III-1 were used where applicable.

TABLE III-1

COMMON CHEMICALS AND THEIR DENSITIES

SOLVENT	DENSITY (lbs/gal)	SOLVENT	DENSITY (lbs/gal)
Acetone	6.59	MIBK	6.68
Alcohol	6.76	Mineral Spirits	6.4
2 Butanone	6.71	Naptha	7.31
Butyl Acetate	7.35	Ortho Dichloro Benzene	10.89
Butyl Cellosolve	7.4	Paint	13.0
Cellosolve	7.8	Perchloroethylene	13.47
Cellosolve Acetate	8.13	Pine Oil	7.17
Creosote Oil	8.92	Polyurethane	9.2
Enamel	8.1	Primer	11.0
Ethanol	6.61	Stoddard	6.38
Ethyl Acetate	7.51	Styrene	7.56
Freon	12.48	Thinner	7.2
Hexane	5.53	Toluene	7.26
Isopropyl Acetate	7.4	Trichloroethylene	12.47
Isopropyl Alcohol	6.55	Varnish	10.2
Kerosene	6.84	Varsol	6.4
Lacquer	8.6	VMP	7.0
Lactol (Nathal) Spirits	6.13	Xylene	7.23
Metaxylol	7.2	Xylol	7.2
Methanol	6.63		
Methylene Chloride	11.12		
Methyl Ethyl Ketone (MEK)	6.71		

10<

There are four general VOC source categories which were considered during the course of this study; they are:

- o gasoline and crude oil storage;
- o gasoline marketing - bulk plants and terminals;
- o surface coating; and
- o degreasing.

Due to the generality of these categories further delineation is useful.

GASOLINE AND CRUDE OIL STORAGE

The petroleum and chemical process industries include many operations. Petroleum production, refining, chemical manufacturing, transportation, marketing, and consumption all require the storage of volatile organic liquids. Storage tanks for volatile organic liquids can be sources of evaporative emissions; and, as a result, the EPA has formulated guidelines to cover the storage of gasoline.

GASOLINE MARKETING

The Gasoline Marketing-Bulk Plants and Terminals category includes tank truck, rail car, and marine vessel seaport terminals in addition to bulk plants. Terminals are located at the end of pipelines, or near refineries and chemical plants for the loading and unloading of crude oil, petroleum products, and organic chemicals. Bulk plants are secondary distribution facilities receiving product by tank truck or rail car and redistributing it by smaller tank trucks. Equipment located at terminals and bulk plants include storage tanks, pumps, valves, and loading arms and hoses. The major portion of the emissions from this category are from storage tanks and loading operations. In addition to the emissions from bulk plants and terminals, there are also significant emissions produced by filling underground storage tanks at gasoline service stations, referred to as Stage I. The vapor balance controls used for this type of source are similar to the control technology utilized for tank truck and tank car unloading.

SURFACE COATING

According to the American Society for Testing and Materials, a surface coating is "a liquid, liquifiable, or mastic composition with is converted to a solid protective, decorative or adherent film after application as a thin layer". The various types of surface coatings include: paints, varnishes, lacquers, stains, shellacs, polymer films, waxes, and oils. These coatings are applied to metal, paper, fabric, wood, glass, stone, concrete, plastic, and other types of surfaces. Table III-2 further details the various products which are subject to the Control Technology Guidelines (CTG). Emissions are a result of evaporation of volatile organic compounds during the application and drying of the coating.

DEGREASING

Degreasing or solvent metal cleaning employs nonaqueous solvents to remove soils from the surface of metal articles which are to be electroplated, painted, repaired, inspected, assembled, or further machined. Metal workpieces are cleaned with organic solvents because water or detergent solutions exhibit a slow drying rate, electrical conductivity, high surface tension, a tendency to cause rusting, and a relatively low solubility for organic soils such as greases. A broad spectrum of organic solvents is available, such as petroleum distillates, chlorinated hydrocarbons, ketones and alcohols. Although solvents may vary, there are basically three types of degreasers: cold cleaners, open top vapor degreasers, and conveyorized degreasers. Emissions are due primarily to evaporation, carry-out and disposal.

ACTUAL AND POTENTIAL EMISSIONS

This study deals with two types of emissions, actual and potential. Actual emissions were defined as the existing level of emissions from a source based on process constituents and the present level of activity. Potential emissions represent an analysis of 'worst case' conditions. Potential emissions are estimated by projecting the actual emission rate to 24-hour continuous daily operation every day of the year with no source control equipment.

TABLE III-2

C.T.G. CATEGORY DEFINITIONS OF COATED PRODUCTS

CATEGORY	PRODUCT(S)
Automobiles and Light Duty Trucks	Automobiles include all passenger cars or passenger car derivatives capable of seating 12 or fewer passengers. Light Duty Trucks include any motor vehicles rated at 8,500 pounds gross vehicle weight or less designed primarily for purposes of transporation of property or are derivatives of such vehicles e.g., pick-ups, vans, and window vans.
Cans	Metal containers used for storage of anything from beverages, meats, fruit, vegetables and other edible products to tennis balls, motor oil and paints.
Coils	Any flat metal sheet or strip that comes in rolls or coils. Finished products are cans, appliances, roof decks, shelving, industrial and residential siding, cameras, culvert stock, cars, gutters, etc.
Paper	Decorative and functional paper products such as adhesive tapes and labels; decorated, coated and glazed paper; book covers; office copier paper (zinc oxide coated); carbon paper; typewriter ribbons; and photographic film.
Fabrics	Textile substrate like industrial and electrical tapes, tire cord, utility meter seals, imitation leathers, tarpauline, shoe materials and upholstery fabrics.
Metal Furniture	Falls under the two categories of (1) business and institutional and (2) household. Includes tables, chairs, waste baskets, beds, desks, lockers, benches, shelving, file cabinets, lamps, room dividers and similar products.
Large Appliances	Includes doors, cases, lids, panels and interior support parts of residential and commercial washers, dryers, ranges, refrigerators, freezers, water heaters, dish washers, trash compactors, air conditioners and other similar products.
Magnetic Wire Insulation	Aluminum or copper wire used in such equipment as electrical motors, generators and transformers to produce an electromagnetic field.

CHAPTER IV

SUMMARY OF EMISSIONS

This chapter presents the facilities that have been identified as having potential emissions of 100 tons per year or greater. It should be noted that all of these sources were not found exclusively through this survey. Some of the sources were identified by the original DEQE survey that preceded the initiation of this project. The third source of information was an emission inventory directed towards facilities with a potential emission rate of 25 to 100 tons per year, which was performed by ES for EPA.

The emissions from 77 plants that were identified are presented in the following tables. Table IV-1 presents each plants actual and potential emissions. In addition this table also presents information on the type of activities which generate VOC emissions within the plant and what control equipment, if any, is utilized. Table IV-2 aggregates the potential emissions from the individual plants according to VOC type category, and Table IV-3 similarly summarizes the estimated actual emissions.

TABLE IV-1

METROPOLITAN BOSTON VOC SOURCES GREATER THAN 100 TPY

CITY/ TOWNSHIP	COMPANY NAME AND ADDRESS	SIC	NUMBER OF EMPLOYEES	VOC CATEGORY	ACTUAL EMISSIONS (TPY)	POTENTIAL EMISSIONS (TPY)	VOC CONTROL DEVICES
Abington	Vulpex Inc 38 Bates St	2295	30	Paper	35	128	None
Acton	WR Grace & Co 50 Independence Road	2899	114	Paper, Organic Chem	157 163	234 2981	None Vapor Condenser
Arlington							
Ashland							
Avon							
Bedford	BASF Systems Crosby Drive	3679	700	Other Surface Coat. (Magnetic Tape)	130	870	Carbon Adsorption
Bedford	Millipore Corp 80 Ashby Road	3569	700	Other Metal Products	396	727	Carbon Adsorption
Belmont							
Beverly	Beverly Mfg Div USM Corp 181 Elliott St	3559	1200	Other Metal Products	69	302	None
Bolton							
Boston	Anderson Power Pdts a145 Newton St		300	Other Metal Products,	2	4	None
				Degreasing	55	550	Condensing Coil
Boston	Boston Herald American 300 Harrison Ave	2711	1100	Graphic Arts	215	215	None

TABLE IV-1

METROPOLITAN BOSTON VOC SOURCES GREATER THAN 100 TPY (cont).

CITY/ TOWNSHIP	COMPANY NAME AND ADDRESS	SIC	NUMBER OF EMPLOYEES	VOC CATEGORY	ACTUAL EMISSIONS (TPY)	POTENTIAL EMISSIONS (TPY)	VOC CONTROL DEVICES
Boston	Gillette Co Gillette Park	3421	3,000	Other Metal Products,	1	1	None
				Degreasing	115	1533	Carbon Adsorption
Boston	Globe Newspaper Co 135 Morrissey Blvd	2711	2,400	Graphic Arts	743	749	
Boston	Interstate Uniform 80 E Cottage St	7216	72	Dry Cleaning	135	567	None
Boston	Modern Electroplating 2430 Washington St	3471	40	Other Metal Products,	32	120	None
				Degreasing	26	97	None
Boston	South Side Dye House 173 Norfolk Ave	7216	23	Dry Cleaning	89	272	None
Boston	Mobil Oil 580 Chelsea	5171		Bulk Gasoline Terminals,	52	945	Loading Rack Vapor Recovery
				Gasoline Bulk Plants	170	1134	
Boston	White Fuel 900 East 1st St	5171	217	Bulk Gasoline Terminals,	1	11	Loading Rack Vapor Recovery
				Gasoline Bulk Plants	13	185	Vapor Recovery

TABLE IV-1

METROPOLITAN BOSTON VOC SOURCES GREATER THAN 100 TPY (cont.)

CITY/ TOWNSHIP	COMPANY NAME AND ADDRESS	SIC	NUMBER OF EMPLOYEES	VOC CATEGORY	ACTUAL EMISSIONS (TPY)	POTENTIAL EMISSIONS (TPY)	VOC CONTROL DEVICES
Braintree	Cities Service	5171		Bulk Gasoline Terminals,	38	686	Loading Rack
				Gasoline Bulk Plants	267	267	
Braintree	JL Hammett Hammett Place	2531	250	Wood Furniture	28	190	None
Bridgewater							
Brockton	MB Claff & Sons 506 N Warren Ave	2651	200	Paper	52	114	None
Brookline							
Burlington							
Cambridge	American Biltrite 29 Hampshire St	3069	400	Rubber Products	83	121	None
Cambridge	Shea Dry Cleaners 1016 Mass Ave	7216	48	Dry Cleaning	74	284	None
Cambridge	Synthon Industries 167 Second Street	2294	25	Adhesives	61	249	None
Cambridge	TRW Carr Div 31 Ames St	3964	600	Degreasing,	152	177	None
				Other Metal	13	15	None

TABLE IV-1

METROPOLITAN BOSTON VOC SOURCES GREATER THAN 100 TPY (cont.)

CITY/ TOWNSHIP	COMPANY NAME AND ADDRESS	SIC	NUMBER OF EMPLOYEES	VOC CATEGORY	ACTUAL EMISSIONS (TPY)	POTENTIAL EMISSIONS (TPY)	VOC CONTROL DEVICES
Canton	Plymouth Rubber 104 Revere St	3069	900	Rubber Products	2401	5258	None
Chelsea	Gulf Oil 123 Eastern Ave	5171	54	Bulk Gasoline terminals,	48	859	Loading Rack Vapor Recovery
				Gasoline Bulk Plants	179	179	None
Chelsa	Samuel Cabot 229 Marginal St	2851	70	Paint Mfg	94	395	None
Chelsa	Texaco 99 Marginal St	5171 5171		Bulk Gasoline Terminals,	46	771	Loading Rack Vapor Recovery
				Gasline Bulk Plants	71	71	
Cohassett Concord	Gen Rad Inc 300 Baker	2825	1000	Other Metal Products,	22	94	None
				Degreasing	1	83	Condensing Unit
Danvers	Creese & Cook Inc 33 Water St	3111	170	Fabric	158	344	None
Danvers	GTE Sylvania Inc 75 Sylvan St	3641	605	Other Surface Coating	367	1315	None

TABLE IV-1

METROPOLITAN BOSTON VOC SOURCES GREATER THAN 100 TPY (cont.)

CITY/ TOWNSHIP	COMPANY NAME AND ADDRESS	SIC	NUMBER OF EMPLOYEES	VOC CATEGORY	ACTUAL EMISSIONS (TPY)	POTENTIAL EMISSIONS (TPY)	VOC CONTROL DEVICES
Dedham							
Dover							
Duxbury							
E. Bridgewater							
Easton	Steadfast Ruber 50 Oliver St	2295	65	Other Surface Coating	1092	4783	None
Easton							
Essex							
Everett	Exxon 151 Bow	5171		Bulk Gasoline Terminals,	50	883	Loading Rack Vapor Recovery
				Gasoline Bulk Plants	236	2145	Vapor Pan
Everett	Hub Fabric Leather 7 Charlton St	2295	20	Fabric	72	315	None
Framingham	Dennison Mfg Co 300 Howard St	2649	2400	Paper	3249	9746	Carbon Adsorption
Framingham	GM Assembly Div 63 Western Ave	3711	3800	Automobiles	2552	5810	None
Gloucester	Lepage's Inc 147 Essex Ave	2641	150	Paper	1667	2447	None

TABLE IV-1

METROPOLITAN BOSTON VOC SOURCES GREATER THAN 100 TPY (cont.)

CITY/ TOWNSHIP	COMPANY NAME AND ADDRESS	SIC	NUMBER OF EMPLOYEES	VOC CATEGORY	ACTUAL EMISSIONS (TPY)	POTENTIAL EMISSIONS (TPY)	VOC CONTROL DEVICES
Hamilton							
Hanover							
Hanson							
Hingham							
Holbrook							
Holliston							
Hopkinton							
Hudson							
Hull Ispwich							
Lexington							
Lincoln							
Lynn	CL Hauthaway & Sons 638 Summer St	2891	55	Organic Chem Mfg	105	227	None
Lynn	North American Phillips Lighting Corp 330 Lynn Way	3639	680	Other Surface Coating	515	1200	None
Lynnfield							
Malden	EJ Lamothe Co 127 Eyllis Ave	2514	25	Metal Furniture	19	143	None
Malden	KJ Quinn 195 Canal St	2842	150	Organic Chem Mfg	95	416	None
Malden	Sterling-Clark-Lurton 184 Commercial St	2851	55	Organic Chem Mfg	91	385	None

TABLE IV-1

METROPOLITAN BOSTON VOC SOURCES GREATER THAN 100 TPY (cont.)

CITY/ TOWNSHIP	COMPANY NAME AND ADDRESS	SIC	NUMBER OF EMPLOYEES	VOC CATEGORY	ACTUAL EMISSIONS (TPY)	POTENTIAL EMISSIONS (TPY)	VOC CONTROL DEVICES
Manchester							
Marblehead							
Marblehead	Lier Siegler Inc Foam Products Div Lime St	3079		Plastics Prod Mfg	594	868	None
Marlborough							
Marshfield							
Maynard	Digital Equipment Corp 146 Main St	3674	3500	Degreasing Other Metal	231 17	323 26	Condensing None
Medfield							
Medford	Container Corp of Amer. 200 Boston Ave	2651	220	Paper	116	163	None
Melrose							
Middleton							
Millis							
Milton							
Nahant							
Natick							
Needham	Damon Corp/IEC	3679	250	Metal Furniture Degreasing	61 2	133 78	None Condensing Coils

TABLE IV-1

METROPOLITAN BOSTON VOC SOURCES GREATER THAN 100 TPY (cont.)

CITY/ TOWNSHIP	COMPANY NAME AND ADDRESS	SIC	NUMBER OF EMPLOYEES	VOC CATEGORY	ACTUAL EMISSIONS (TPY)	POTENTIAL EMISSIONS (TPY)	VOC CONTROL DEVICES
Newton	TRW Carr Div 459 Watertown St	3499	205	Degreasing	58	242	None
Norfold N. Reading							
Norwell							
Norwood	Polaroid Corp 1 Upland Road	3861	3150	Organic Chem Mfg	152	333	None
				Other Surface Coating	31	68	None
				Degreasing	25	155	Condensing Coils
Peabody	National Tanning & Trading Corp Webster St	3111	190	Fabric	46	132	None
Peabody	S & S Leather (Henry Leather) 150 Main St	311	100	Fabric	105	251	None

TABLE IV-1

METROPOLITAN BOSTON VOC SOURCES GREATER THAN 100 TPY (cont.)

CITY/ TOWNSHIP	COMPANY NAME AND ADDRESS	SIC	NUMBER OF EMPLOYEES	VOC CATEGORY	ACTUAL EMISSIONS (TPY)	POTENTIAL EMISSIONS (TPY)	VOC CONTROL DEVICES
Peabody	Stahl Finish Corwin St	2842	60	Organic Chem Mfg	44	192	None
Pembroke	Patriot Ledger 13 Temple St	2711	365	Graphic Arts	53	123	None
Quincy							
Randolph	Chase & Sons Inc 19 Highland Ave	3069	100	Fabric Organic Chem Mfg	219 16	959 70	None None
Reading							
Revere	Atlantic Richfield 140 Lee Burbank Hwy	5171	33	Bulk Gasoline Terminals Gasoline Bulk Plants	31 46	571 46	Loading Rack None
Revere	Gibbs Oil 40 Lee Burbank Hwy	5171	220	Bulk Gasoline Terminals Gasoline Bulk Plants	133 155 155	2427 155 155	Loading Rack Vapor Recovery None

TABLE IV-1

METROPOLITAN BOSTON VOC SOURCES GREATER THAN 100 TPY (cont.)

CITY/ TOWNSHIP	COMPANY NAME AND ADDRESS	SIC	NUMBER OF EMPLOYEES	VOC CATEGORY	ACTUAL EMISSIONS (TPY)	POTENTIAL EMISSIONS (TPY)	VOC CONTROL DEVICES
Revere	Northeast Petroleum 96 Lee Burbank Hwy	5171	7	Bulk Gasoline Terminals, Gasoline Bulk Plants	18 176	647 176	Loading Rack Vapor Recovery None
Revere	Union Oil 222 Lee Burbank Hwy	5171		Bulk Gasoline Terminals, Gasoline Bulk Plants	36 137	645 137	Loading Rack Vapor Recovery None
Rockland	Boston Whaler Inc 1149 Hingham St	3732	198	Other Surface Coating	101	355	None
Rockland	National Coating Corp 254 Beech St	3079	15	Paper	76	334	None
Rockport	Tadco Mfg Inc. Poole's Land	2715	40	Other Surface Coating	27	118	None
Salem	Beverly Leather 12 Hanson St	3111	6	Fabric	232	1014	

TABLE IV-1

METROPOLITAN BOSTON VOC SOURCES GREATER THAN 100 TPY (cont.)

CITY/ TOWNSHIP	COMPANY NAME AND ADDRESS	SIC	NUMBER OF EMPLOYEES	VOC CATEGORY	ACTUAL EMISSIONS (TPY)	POTENTIAL EMISSIONS (TPY)	VOC CONTROL DEVICES
Saugus							
Scituate							
Sharon							
Sherborn							
Somerville	Linvure Co., Inc. 61 Clyde St	2643	1000	Paper	293	374	None
Somerville	Republic Foil Div National Steel 43 Third Ave	2643	100	Other Surface	77	107	None
Southboro	Data General Corp Route 9	3573	2400	Degreasing	90	5466	Carbon Adsorption
Stoneham							
Stoughton	Shawmut Mills Div Duplan Corp 208 Canton St	2295	85	Adhesives	20	106	None
Stow							
Sudbury	Coatings Engineering 33 Union Ave	3479	110	Other Metal	647	3004	None
Swampscott							
Tossfield							

TABLE IV-1

METROPOLITAN BOSTON VOC SOURCES GREATER THAN 100 TPY (cont.)

CITY/ TOWNSHIP	COMPANY NAME AND ADDRESS	SIC	NUMBER OF EMPLOYEES	VOC CATEGORY	ACTUAL EMISSIONS (TPY)	POTENTIAL EMISSIONS (TPY)	VOC CONTROL DEVICES
Wakefield							
Walpole	Norton Company 2000 Main St	2295	40	Fabric	281	615	None
Waltham	Exxon 50 Jones Rd	5171		Bulk Gasoline Terminals,	11	205	Loading Rack Vapor Recovery
				Gasoline Bulk Plants	75	425	Vapor Pan
Waltham	Hewlett Packard Co 175 Wyman St	3693	900	Other Metal Products,	27	57	None
				Degreasing	37	78	None
Waltham	Polaroid Corp 1265 Main St	3861	530	Organic Chem Mfg	2402	3134	Condenser
Waltham	Printed Circuit Corp 180 Elm St	3679	210	Degreasing	240	459	None
Waltham	Standard-Thompson Corp 152 Grove St	3882	490	Degreasing	71	313	None
Watertown	Fay Specialties 60 Acton St	2295	6	Fabric	34	149	None
Watertown	Haartz-Mason 270 Pleasant St	3069	104	Fabric	309	1353	None

TABLE IV-1

METROPOLITAN BOSTON VOC SOURCES GREATER THAN 100 TPY (cont.)

CITY/ TOWNSHIP	COMPANY NAME AND ADDRESS	SIC	NUMBER OF EMPLOYEES	VOC CATEGORY	ACTUAL EMISSIONS (TPY)	POTENTIAL EMISSIONS (TPY)	VOC CONTROL DEVICES
Watertown	O'Dell Company 60 Acton St	2296	50	Fabric	250	1095	None
Wayland							
Wellesley							
Wenham							
W. Bridgewater							
Weston							
Weymouth							
Whitman	E Norris Brown 58 S Washington St	2511	89	Wood Furniture	52	112	None
Wilmington	Compugraphic Corp 65 Industrial kWay	3555	150	Other Metal Degreasing	29 10	127 44	None None
Wilmington	Sweetheart Plastics 1 Burlington Ave	3079	1400	Paper Plastic	70 135	98 189	None None
Winchester	JH Winn Inc 620 Washington St	3469	250	Other Metal Degreasing	38 25	160 137	None None
Winthrop							
Woburn	Madico Inc 64 Industrial Pkwy	3079	110	Adhesives	72	158	None

TABLE IV-2

SUMMARY OF POTENTIAL VOC SOURCES WITH

EMISSIONS OF 100 TPY OR GREATER

SOURCE		EMISSIONS (tpy)
Storage, Transportation & Marketing of Petroleum Products	Bulk Gasoline Terminals	8,659
	Gasoline Bulk Plants	4,920
Industrial Processes	Organic Chemical Mfg.	7,738
	Paint Mfg.	395
	Vegetable Oil Processing	0
	Pharmaceutical Mfg.	0
	Plastics Products Mfg.	1,057
	Rubber Products Mfg.	5,379
	Textile Polymers Mfg.	0
	Other Industrial Processes	0
Industrial Surface Coating	Large Appliances	0
	Magnet Wire	0
	Automobiles	5,810
	Cans	0
	Metal Coils	0
	Paper	13,264
	Fabric	6,227
	Metal Furniture	276
	Wood Furniture	232
	Flat Wood Products	0
	Other Metal Products	4,517
	Other Industrial Coat.	4,033
Other Solvent Use	Degreasing	9,179
	Dry Cleaning	1,123
	Graphic Arts	1,087
	Adhesives	513
	Cutback Asphalt	*
	Other Solvent Use	0
Total VOC Emissions		74,409

*Not inventoried

TABLE IV-3

SUMMARY OF ACTUAL VOC SOURCES WITH EMISSIONS OF 100 TPY OR GREATER

SOURCE		EMISSIONS (tpy)
Storage, Transportation & Marketing of Petroleum Products	Bulk Gasoline Terminals	464
	Gasoline Bulk Plants	1,525
Industrial Processes	Organic Chemical Mfg.	3,068
	Paint Mfg.	94
	Vegetable Oil Processing	0
	Pharmaceutical Mfg.	0
	Plastics Products Mfg.	729
	Rubber Products Mfg.	2,484
	Textile Polymers Mfg.	0
	Other Industrial Processes	0
Industrial Surface Coating	Large Appliances	0
	Magnet Wire	0
	Automobiles	2,552
	Cans	0
	Metal Coils	0
	Paper	5,422
	Fabric	1,706
	Metal Furniture	80
	Wood Furniture	80
	Flat Wood Products	0
	Other Metal Products	1,261
	Other Industrial Coat.	1,248
Other Solvent Use	Degreasing	872
	Dry Cleaning	298
	Graphic Arts	1,011
	Adhesives	153
	Cutback Asphalt	*
	Other Solvent Use	0
Total VOC Emissions		23,047

*Not inventoried

29<

CHAPTER V

ANALYSIS OF VOC REGULATIONS

The purpose of this chapter is to present an overview of the existing VOC regulations and their applicability to this study.

BACKGROUND

In the past most air pollution control regulations in the United States applicable to stationary VOC sources were patterned after Rule 66 of the Los Angeles County Air Pollution Control District. As a result the two major strategies for such plans were positive VOC reduction and solvent substitution. However, solvent substitution is no longer considered to be an appropriate control strategy by the EPA. A 1976 Policy Statement made by EPA emphasized that the reactivity concept was useful as an interim measure only, and would not be considered a reduction in organic emissions for the purposes of estimating attainment of the NAAQS for oxidants. This policy is the result of increased understanding of the relative degree of reactivity of various materials originally believed to be of negligible effect in the formation of photochemical oxidants. There are three factors which affect this policy statement. First, many of the VOC that previously have been designated as having low reactivity are now known to be moderately or highly reactive in urban atmospheres. Second, even compounds that are presently known to have low reactivity can form appreciable amounts of oxidant under multiday stagnation conditions such as occur during the summer in many areas. Third, some compounds of low or negligible reactivity may have other deleterious effects.

There are only four compounds which are recommended for exclusion from SIP regulations; therefore, it is not necessary that they be inventoried or controlled. These compounds are:

- Methane
- Ethane
- 1,1,1 - Trichloroethane (Methyl Chloroform)
- Trichlorotrifluoroethane (Freon 113)

When determining reductions required to meet oxidant NAAQS, these VOC should not be included in the base line inventory nor should reductions in their emissions be credited toward achievement of the NAAQS. As a result, these compounds were considered exempt from the emissions calculations for this study.

It should be noted that although the four compounds listed above are exempt from VOC regulations the latter two, methyl chloroform and Freon 113, are halogenated compounds which may cause deterioration of the earth's ultraviolet radiation shield, i.e., stratospheric ozone layer. As more information becomes available on this problem the EPA may find it necessary to control these two compounds on that basis.

CONTROL TECHNOLOGY GUIDELINES

In order to assist local governments in their analysis of appropriate positive reduction methods for VOC control the EPA has published Control Technology Guidelines (CTG) for stationary VOC sources as required by the 1977 Clean Air Act Amendments. These documents examine the constituents of each of the five major VOC categories as described in Chapter III. For each process analyzed, the documents discuss the sources of VOC emissions and suggest control methods. Table V-1 lists the schedule for issuance of the CTG documents. This schedule is important because the issuance of a CTG document covering a specific process in effect dictates the future date when the EPA will expect regulations concerning that process to become effective. Through the use of the CTG documents regulations can be formulated which reasonably address necessary VOC reductions while taking into account environmental and economic factors.

REVIEW OF BOSTON AQCR REGULATIONS

As stated in the preamble of 310CMR7.00 the purpose of the Massachuseetts air pollution control regulations is to prevent conditions of air pollution where the conditions do not exist and to facilitate abatement in cases where conditions of air pollution do exist. "They [the regulations] are designed

TABLE V-1

CONTROL TECHNIQUES GUIDELINES FOR STATIONARY SOURCES OF VOLATILE ORGANIC COMPOUNDS

SOURCE CATEGORY	RELEASE DATE
Pharmaceutical Manufacture	December, 1978
Rubber Tire Manufacture	December, 1978
Graphic Arts (Printing)	December, 1978
Petroleum Liquid Storage, Floating Roof Tanks	December, 1978
Dry Cleaning, Perchloroethylene	December, 1978
Gasoline Tank Trucks Leak Prevention	December, 1978
Architectural and Miscellaneous Coatings	1979
SBR Rubber Manufacture	1979
Service Stations, Stage II	1979
Organic Chemical Manufacture	
Process Streams[1]	1979
Fugitive (Leaks)	1979
Waste Disposal	1979
Storage and Handling	1979
Ship and Barge Transport of Gasoline and Crude Oil	1979
Wood Furniture Manufacture	1979
Large Appliance Manufacture	1977
Magnet Wire Insulation	1977
Gasoline Bulk Plants	1977
Metal Furniture Manufacture	1977
Petroleum Liquid Storage, Fixed Roof Tanks	1977
Degreasing	1977

32<

TABLE V-1 (cont.)

CONTROL TECHNIQUES GUIDELINES FOR STATIONARY SOURCES OF VOLATILE ORGANIC COMPOUNDS

SOURCE CATEGORY	RELEASE DATE
Bulk Gasoline Terminals	1977
Petroleum Refinery Vacuum Systems, Wastewater Separators and Process Unit Turnarounds	1977
Petroleum Refinery Vacuum Systems, Wastewater Separators and Process Unit Turnarounds	1977
Cutback Asphalt Paving	1977
Surface Coating of Automobiles, Cans, Metal Coils, Paper, and Fabric Products	1977
Petroleum Refinery Fugitive Emissions (Leaks)	July, 1978
Surface Coating of Miscellaneous Metal Parts and Products	July, 1978
Vegetable Oil Processing	July, 1978
Factory Surface Coating of Flatwood Paneling	July, 1978
Service Stations, Stage I	Control Technology information has been widely distributed, available on request.[2]

[1] The CTG planned for 1979 will cover some generic or unit operations concerned with chemical manufacturing processes, e.g., air oxidation, drying, distillation.

[2] "Design Criteria for Stage I Vapor Control Systems Gasoline Stations," U.S. Environmental Protection Agency, November, 1975, and "A Study of Vapor Control Methods for Gasoline Marketing Operations: Volume I - Industry Survey and Control Techniques," U.S. Environmental Protection Agency, EPA-450/3-75-046a, April 1975.

to attain, preserve, and conserve the highest possible quality of the ambient air compatible with the needs of the society."

In addition to the Massachusetts code of regulations the Boston AQCR is also subject to regulations under Title 40 of the Code of Federal Regulations (CFR). These regulations are part of a Transportation Control Plan that was originally promulgated by the Administrator of the EPA in November of 1973. The reason for this second set of regulations is that in Massachusetts' original implementation plan in 1975 methods for meeting the oxidant and carbon monoxide standards were not provided. As a result of that omission and in accordance with the Clean Air Act EPA had to promulgate a Transportation Control Plan (TCP) for the Boston Intrastate Region.

Typical gasoline product storage and marketing control techniques, which are applicable to the Boston AQCR, are stipulated in 310CMR, Section 7.02. These controls include: submerged fill and vapor recovery methods for transfer operations, i.e., Stage I and Stage II controls; floating roof tanks, pressurized tanks, vapor recovery systems or an equivalent for tanks with a capacity of greater than 40,000 gallons used to store products with a true vapor pressure of 1.5 to 11.0 psi; pressure tank systems, vapor recovery systems or an equivalent for tanks with a capacity greater than 40,000 gallons used to store products with a true vapor pressure greater than 11 psi; and vapor recovery systems for loading racks with a daily throughput of greater than 20,000 gallons using a product with a true vapor pressure of 1.5 psi or greater.

The Code of Massachusetts Regulations also contains stipulations which necessitate that facilities register annually with DEQE, semi-annually for sources which emit 100 tons or more a year. This procedure helps the Department assess the present loading on ambient air quality in addition to providing background information for their required assessments of the impact on the environment of any new facilities which would emit 100 tons per year or greater.

Regulations, applicable to the Boston AQCR, regarding organic solvent use as listed in Part 52.1145 of Chapter I, Title 40 of the Code of Federal Regulations necessitate the reduction of emissions by 85% on processes subject to the regulations. In general, the applicable processes are (1) those emitting more than 15 pounds of organic material in 1 day, or more than 3 pounds in 1 hour, from any process equipment using organic solvent which comes into contact with flame or is baked, heat-cured, or heat-polymerized in the presence of oxygen; and (2) those emitting more than 40 pounds of organic material in 1 day, or more than 8 pounds in 1 hour, from any process contrivance other than described in number 1 above, or applying any solvent of high photochemical reactivity or any material containing such photochemical reactive solvent.

To put the emission levels from the organic solvent use regulations in perspective, the emissions limit of 100 tons per year used for this study would represent an emission rate of approximately 550 lbs. per day, 365 days per year. Needless to say this illustrates that virtually all the solvent use processes presented in this study would be subject to the regulations.

APPENDIX A

METRO BOSTON AQCR - VOC MAILING LIST

APPENIX A

METRO BOSTON AQCR - VOC MAILING LIST

NAME	SIC	ADDRESS
Abbey Plastics	2821	P. O. Box 336, Hudson, MA
Affiliated Publications, Inc.	2711	135 Morrissey Blvd., Boston 02125
Alpha Chemical Services Inc.	2842	46 Morton St., Stoughton, MA
American Biltrite, Inc. Biltrite Ftwr. Prod. Div.	3069	22 Willow St., Chelsea 02150
American Celop. Pla. Flm. Corp.	2643	19 Bratlett Square, Boston 02130
American London Adams Bonding	2231	932 Washington St., Norwood, MA
American Publishing Corp.	3944	125 Walnut St., Watertown, Ma
Andrew Roberts, Inc.	3079	29 Washington Ave., Natick, MA
Applicon, Inc.	3573	154 Middlesex Tpk., Burlington, MA
Approved Rubber Corp.	3069	140 Lincoln St., Winthrop, MA
Araban Coffee	2095	385 Summer St., Boston, MA
Atlantic Microwave Corp.	3679	Route 117, Bolton, MA
Atlantic Richfield	5171	140 Lee Burbank Hwy., Revere, MA
Avon Corrugated Corp.	2653	Campanelli Circle, Canton 02021
Barmar Plastic Corp.	3079	10911 Purchase St., Boston, MA
BASF Systems	3679	Crosby Dr., Bedford, MA
Bicknell and Fuller	2653	Peabody Indus. Park, Peabody, MA
Boston Whaler, Inc.	3732	1149 Hingham St., Rockland 02370
Bradon Plasticrafts	3079	40 Clyde St., Needham, MA
Butcher Polish Co.	2842	P. O. Box G, Bartlett St., Marlborough, MA

APPENDIX A (CONT.)

METRO BOSTON AQCR - VOC MAILING LIST

NAME	SIC	ADDRESS
Cabot Corporation	2895	125 High St., Boston 02110
Carr Fastener	3964	31 Ames St., Cambridge, MA
Ceramics Grinding Co., Inc.	3079	74 Clematis Ave., Waltham, MA
Champeys Rubber Cutting	3069	64A Summer St., Somerville, MA
Chase & Sons	3069	19 Highland Ave., Randolph, MA
Chemical Development Corp.	2891	Endicott St., Danvers, MA
Christian Science Pubg. Soc. Vol. Tr. Christian Science Monitor	2711	1 Norway St., Boston 02115
Cities Service	5171	345 Quincy, E. Boston, MA
Colonial Wood Heel Co.	3079	429 Washington St., Lynn, MA
Compugraphic Corp.	3555	Industrial Way, Wilmington, MA
Continental Chemical & Coatings Corp.	2891	219 New Boston St., Woburn, MA
Court Square Press, Inc.	2751	14-16 Greenbaum St., Boston 02127
Damon Corp.	3079	115 Fourth Ave., Needham Hts., MA
Data Terminal Systems	3643	124 Acton St., Maynard, MA
Deepwater Oil Terminal, Inc.	5171	56 Federal Ave., Quincy, MA
Dell Co.	2296	60 Acton St., Watertown, MA
D. G. O'Brien, Inc.	3643	500 Cochituate Rd., P. O. Box 829, Framingham, MA
Duplan Corp.	2295	208 Canton St., Stoughton 02072
Eastern Cellophane, Inc.	2643	10911 Purchase St., Boston, MA

APPENDIX A (CONT.)

METRO BOSTON AQCR - VOC MAILING LIST

NAME	SIC	ADDRESS
Edward J. Poitras Trust	3079	159 Chestnut St., Ashland, MA
Eltra Corp.	3021	55 Fordham Rd., Wilmington 01887
Enterprise Publ. Co. Brockton Enterprise Times	2711	60 Main St., Brockton 02401
Film Microelectronics, Inc.	3679	17 A Street, Burlington, MA
Finco, Inc.	3041	185 Essex St., Melrose, MA
Foam Lock Corporation	3079	99 Chancy St., Boston, MA
Franklin Sports Industries, Inc.	3944	17 Campanelli Pkwy., Stoughton, MA
General Connector Corp.	3643	80 Bridge St., Newton, MA
General Mills Fun Group Parker Bros. Div.	3944	190 Bridge St., Salem 01970
General Ship & Engine Wks.	3732	Border St., Boston 02128
Gibbs Oil	5171	40 Lee Burbank Hwy., Revere, MA
Gleasons Inc. of Framingham	5171	35 Claflin St., Framingham, MA
Goodway Graphics of Mass., Inc.	2751	22 A St., Burlington, MA
Graphic Arts Finishers, Inc.	2641	32 Cambridge St., Boston 02129
GTE-Sylvania	3641	100 Endicott St., Danvers, MA
Harvard Folding Box Co., Inc.	2651	71 Linden St., Lynn 01901
H. B. Fuller Pkg. Div.	2891	2400 Kasota Ave., St. Paul, Minn
Herbert Lushan Plastics	3079	P. O. Box 232, Chestnut Hill, MA
H. K. Porter, Inc.	3423	74 Foley St., Somerville, MA
Hoague-Sprague Corp.	2641	520 Boylston St., Boston, MA

APPENDIX A (CONT.)

METRO BOSTON AQCR - VOC MAILING LIST

NAME	SIC	ADDRESS
Holly Cleaners	7216	724 Beacon St., Newton Center, MA
Hood Industries, Inc.	2821	14 Audubon Rd., Wakefield, MA
House of David	7216	135 Essex St., Lynn, MA
Hub Folding Box Co., Inc.	2651	14-18 Binford St., Boston 02210
Humble Oil	5171	515 Bow St., Everett, MA
Humble Oil	5171	50 Jones Rd., Waltham, MA
Hyperion Industries Corp.	3679	134 Coolidge Ave., Watertown, MA
Infrared Industries, Inc.	3679	62 Fourth Ave., Waltham, MA
Instrument Corp.	3679	80 Turnpike Rd., Westboro, MA
Insul. Tab, Inc.	3079	250 Mishawum Rd., Woburn, MA
Itek Tube, Inc.	2643	Warwick & Clyde Sts., Somerville, MA
ITT Lamp Division	3639	330 Lynnway, Lynn, MA
J. L. Thomson Rivet Corp.	3452	Sawyer Rd., Waltham, MA
John F. Menzel, Inc., A & M Plastic	2821	Hayes Memorial Dr., Marlborough, MA
J. P. Plastics, Inc.	3079	294 Pleasant St., Stoughton, MA
Kalliroscope Corp.	3079	145 Main St., Cambridge, MA
Kendall Company Fiber Products Div.	2297	95 West St., Walpole 02081
Kyanize Paints, Inc.	2851	Corner & Second Sts., Everett, MA
Lani Sheen Clnrs.	7216	173 Norfolk Ave., Roxbury, MA
Lawson Coin Wash	7216	229 N. Main St., Natick, MA

APPENDIX A (CONT.)

METRO BOSTON AQCR - VOC MAILING LIST

NAME	SIC	ADDRESS
Lear Siegler, Inc., Hood Foam Div.	3079	Lime St., Marblehead, MA
Lenza Oil Terminals	5171	205 Lexington St., Waltham, MA
Lepages, Inc.	2641	147 Essex Ave., Glouster, MA
Linvure Company, Inc.	2643	61 Clyde St., Somerville 02145
Litton Busns. Sys., Inc. Plimpton Statnr. Div.	2732	165 Lenox St., Norwood 02062
Longview Firre Co. Waltham Bag & Paper Co.	2643	20 Cooper Lane, Waltham 02154
Luther Paul Wholesale Distr.	3079	49 Congrees St., Salem, MA
Maynard Plastics, Inc.	3079	49 Congress St., Salem, MA
Mech. EL Industries, Inc.	3674	73 Pine St., Woburn, MA
Miko Mfg. Corp.	3079	18 Green St., Malden, MA
Nan San Industries, Inc.	3079	70 Birch St., N. Abington, MA
National Coating Corp.	3079	254 Beech St., Rockland, MA
New Eng. Plastics Corp.	3079	310 Salem St., Box 250, Woburn, MA
News Publishing Co.	2711	375 Cochituate Rd., Framingham, MA
Nichols WHC	3586	48 Woerd Ave., Waltham, MA
Noonan Brothers Oil Col	5171	15 Allen St., Brockton, MA
No. Amer. Plastics Corp.	3079	131 Veverly St., Boston, MA
North East Petroleum Corp.	5171	295 Eastern Ave., Chelsea, MA
North Shore Petrol., Inc.	5171	385 Atlantic Ave., Marblehead, MA
Norton Company Sawyer Tower Products	2295	76 Stanley Ave., Watertown 02172

APPENDIX A (CONT.)

METRO BOSTON AQCR - VOC MAILING LIST

NAME	SIC	ADDRESS
Olympic Adhesives, Inc.	2891	670 Canton St., Norwood, MA
Orbit Plastics Corp.	3079	35 Congress St., Shetland Indus. Park, Salem, MA
Pace Setter Prod.	2295	53 Mason St., Box 587, Salem, MA
Packard Paper Box Co., Inc.	2651	Peabody Indus. Pk., Peabody 01960
Paris Worcester Corp.	2651	130 Eastern Ave., Lynn 01902
Phillips Mfg. Co., Inc.	3079	Industrial Dr., Canton, MA
Plastic Lace, Inc.	3079	P. O. Box 2026, 47 Congress St., Salem, MA
Plymouth Rubber	3069	Revere St., Canton, MA
Polarois	2899	868 Winter St., Waltham, MA
Polaroid Corp., Film Div.	3861	1265 Main St., Waltham 02154
Polaroid Corp.	3861	640 Memorial Dr., Cambridge 02139
Polaroid Corp.	3861	Norwood Bldg., 1 & 2, Norwood 02062
Polaroid Corp.	3861	Osborn St., Cambridge 02139
Polaroid Corp.	3861	549 Technology Square, Cambridge 02139
Polyvinyl Chem.	2851	730 Main St., Wilmington, MA
Printed Circuit Corp.	3679	18 Elm St., Waltham, MA
Purity Oil Co.	5171	172 Allen St., Lynn, MA
Rainbow Plastics	3079	380 W. Center St., W. Bridgewater, MA
Rexham Corp.	2651	1201 Greenwood Cliff, Charlotte, NC
Salem Laundry	7216	69 Lafayette, Salem, MA

APPENDIX A (CONT.)

METRO BOSTON AQCR - VOC MAILING LIST

NAME	SIC	ADDRESS
Salem Plastic	2821	49 Congress St., Salem, MA
Sangamo Electric Co.	3679	11th and Converse St., Springfield, Ill.
Solid State Technol., Inc.	3674	11 Upton Drive, Wilmington, MA
S & S Leather	3111	150 Main St., Peabody, MA
State Circuits	3679	1325 Old Worcester Rd., Framingham, MA
Stav, Inc.	3079	6 Eaton St., Brockton, MA
Stedfast Rubber	2295	30 Topalian St., Boston, MA
St. Regis Paper Co. Laminated Ctd. Pdts. Div.	2641	156 Oak St., Newton 02164
Sterling-Clark-Lurton Corp.	2851	184 Commercial St., Malden, MA
Stride Rite Manuf.	3149	960 Harrison Ave., Boston, MA
Surface Coating	2851	100 Eames St., Wilmington, MA
Sweetheart Plastic, Inc. Guild Machine Div.	3079	1 Burlington Ave., Wilmington 01887
Tech. Communications Corp.	3679	442 Marrett Rd., Lexington, MA
Terminal Oil	5171	40 Lee Burbank Ave., Revere, MA
Texaco, Inc.	5171	99 Marginal St., Chelsea, MA
Thermonetics Ltd., Inc.	3079	587 Granite St., Braintree, MA
Tony's Oil Service	5171	209 Green St., N. Weymouth, MA
Transworld Adhesives & Chemical Co.	2891	Air Sta. Indus. Pk., Rockland, MA
Travco Labs., Inc.	2851	345 Eastern Ave., Chelsea, MA

APPENDIX A (CONT.)

METRO BOSTON AQCR - VOC MAILING LIST

NAME	SIC	ADDRESS
Trimount Bituminous Prdts. Co.	2951	1840 Revere Beach Pwky., Everett 02149
Waldroth Label Corporation	2641	Avon Industrial Park, Avon 12322
Webster Industries	2643	58 Rear Pulaski St., Peabody 01960
Weymouth Art Leather	2295	180 Pearl St., Braintree, MA
White Fuel	5171	580 Pleasant St., Watertown, MA
W. M. Gulliksen	3079	187 Gardner St., W. Roxbury, MA
Woburn Degreasers	3111	132 Bedford St., Woburn, MA
X S Engraving Mfg., Inc.	3079	135 Athens St., S. Boston, MA
Zurn Industries	3599	1801 Pittsburgh Ave., Erie, PA

APPENDIX B

SURVEY PACKAGE

DAVID STANDLEY
Commissioner
727-5194

The Commonwealth of Massachusetts
Department of Environmental Quality Engineering
Metropolitan Boston - Northeast Region
600 Washington Street, Boston, Ma. 02111

June 22, 1978

Gentlemen:

The Division of Air and Hazardous Materials must develop regulations limiting the quantities of volatile organic compounds emitted from sources in the Commonwealth in order to achieve compliance with the photochemical oxidant standard as required by the Federal Clean Air Act Amendments of 1977.

It is the Division's desire to develop regulations that will provide for the necessary reduction in volatile organic compound emissions without imposing undue economic hardship on the industries in the Commonwealth utilizing these compounds. Toward this end, the Metropolitan Boston Region must update its inventory of commercial and industrial facilities within the Region to determine the types and quantities of volatile organic compounds presently being emitted.

The Region has determined that the nature of operations at your facility may involve the use of volatile organic compounds. Regulation 310 CMR 7.12, Registration, Record Keeping, and Reporting, requires that you complete the enclosed inventory form and return it. Failure to meet this requirement will result in the Department initiating appropriate legal action to obtain this information.

You are requested to return the form within thirty (30) days. If you have any questions or need assistance, please do not hesitate to call Donald Squires, Senior Air Pollution Control Engineer, telephone number 727-4609. The Commonwealth is being assisted by Engineering Sciences of McLean, Virginia in completing this inventory. You may be contacted by them to clarify information submitted.

Thank you in advance for your cooperation.

Very truly yours,

John A. Desmond

John A. Desmond
Chief
Air Quality Control Section

46<

D/Ect

Enclosure

COMMONWEALTH OF MASSACHUSETTS

DEPARTMENT OF ENVIRONMENTAL QUALITY ENGINEERING
DIVISION OF AIR AND HAZARDOUS MATERIALS

FORM FOR THE REGISTRATION OF HYDROCARBON EMISSIONS

Please complete and return this form to the Metropolitan Boston Air Quality Control Region, Room 320, 600 Washington Street, Boston, MA. 02111. Should you have any questions, call 727-4609, 5195.

Company Name_____

Plant Address_____

Mailing Address_____

Contact_____Title_____

Telephone Number_____

Approximate number of employees at this plant address_____

Normal operating schedule of this facility_____hr/day _____days/wk. _____wk/yr.

Indicate the percentage of annual production produced per quarter:

First_____Second_____Third_____Fourth_____

CERTIFICATION to be signed by responsible corporate official: I certify that I have examined the information on this form and that, to the best of my knowledge, it is true and complete.

Signed_____ Date_____

Title_____

How many gallons of material containing volatile hydrocarbons, such as cleaning fluids, fuels, coatings, adhesives, inks, or solvents, are purchased by this facility annually? _____

SUPPLIER	ADDRESS OF SUPPLIER	TYPE OF MATERIALS	QUANTITY PURCHASED	DENSITY OF MATERIAL

STACK INFORMATION AND HYDROCARBON CONTROL INFORMATION

Complete the table below for all stacks which exhaust volatile organic compounds and for all hydrocarbon collection equipment. Number the sources to agree with data submitted on the following pages of this form.

Stack data need not be submitted for stacks which do not emit hydrocarbons.

Source Number	Process or Operation	Type of Process Equipment	No. of Units	HYDROCARBON CONTROL EQUIPMENT		STACK INFORMATION				
				Type of Control Device	Estimated Control Efficiency	Exit Ht. Above Grnd.(ft)	Inside Dia. (ft)	Temp (°F)	Exhaust Flowrate (cfm)	Stack Exit Velocity (ft/sec)

SURFACE COATING

Complete this sheet for all painting, printing, treating or coating of paper, metals, fabric, etc., in which hydrocarbons are used. Should additional space be needed for reporting, submit addendum.

Source Number	Material Being Coated	Estimated Amount of Material Coated Annually	Coating Method Used	Type of Coating Applied	Amount of Coating Applied per Year (Pounds or Gallons)

SURFACE COATING (Continued)

Source Number	Temperature At Which Coating Is Applied or Cured	Type of Solvent In Undiluted Coating	Wt. Solvent In Undiluted Coating (lb/gal)	Type of Solvent Added to Coating	Amount of Solvent Added Per Year (Pounds or Gallons)

How much, if any, solvent is shipped out for recovery or disposal?_____gal/year.

What type(s) of cleaning solvent is(are) used?_____

How much cleaning solvent is used per year?_____

CLEANING, DEGREASING AND/OR DRYCLEANING

Complete this page for operations such as cold solvent cleaning, hot solvent cleaning, and vapor degreasing. Stoddard solvent, 1,1,1 trichloroethane, perchloroethylene, methylene chloride, and trichloroethylene are examples of solvents that must be reported.

Source Number	Operation	Type of Material Treated	Pounds of Material Treated Annually	Type of Solvent Used	Gallons Used Annually

Source Number	Temperature of Solvent In Use (°F)	Type of Emission Control Device	Estimated Control Efficiency	Waste Solvent Disposal Method	Gallons of Solvent Disposed of Annually

MANUFACTURING

Complete the sheet for all operations which utilize hydrocarbons as a raw material or which produce an end product containing hydrocarbons.

Brief Description of Process _____

Source Number	Process or Operation Using Hydrocarbons	Type of Material Processed	Annual Process Throughput	Type and Weight of Volatile Hydrocarbons In Processed Material	Quantity of Volatile Hydrocarbons Lost of Atmosphere During Processing (lbs/yr)	Method Used To Determine Emission (emission factor or material balance)

STORAGE TANK DATA
TANK CHARACTERISTICS, PRODUCT AND EMISSIONS INFORMATION

1. INTERNAL ID CODE FOR STORAGE TANK UNIT	5. TANK CHARACTERISTICS (See Below)									6. PRODUCT STORED	7. PRODUCT CHARACTERISTICS					8. TANK EMISSIONS		
	a. LOCATION	b. FILL METH	c. ROOF TYPE	d. SEAL TYPE	e. SEAL COND	f. SHELL CONST	g. ROOF COLOR	h. SHELL COLOR	i. PAINT COND		a. VAPOR DENSITY (lbs/gal)	b. VAPOR MOLE WT (lbs/mole)	c. REID VAPOR PRESSURE (psia)	d. STORAGE TEMP (°F) Normal	d. STORAGE TEMP (°F) Maximum	a. AMOUNT Normal	a. AMOUNT Maximum	b. ESTIMATION METHOD

9. AVG AMBIENT TEMPERATURE (°F)

10. AVG DIURNAL TEMP CHANGE (°F)

11. AVG WIND VELOCITY (mph)

5. TANK CHARACTERISTICS Enter one of the choices provided, if space permits, or the characters shown to the left of the choice. If another response is more appropriate, enter it or an abbreviation. When the latter is used, define the abbreviation below.

a. LOCATION
ABV-above ground
UND-underground

b. FILL METH
SUB-submerged
SPL-splash
BTM-bottom loading

c. ROOF TYPE
1-fixed
2-floating pan
3-floating pontoon
4-floating double deck
5-variable vapor space
6-pressurized

d. SEAL TYPE
S-single
D-double

e. SEAL CONDITION
T-tight
L-loose (includes pre-1942 seals)

f. SHELL CONSTRUCTION
RIV-riveted
WELD-welded
GUN-gunite
EPOX-epoxy coated rivets

i. PAINT CONDITION
G-good
P-poor

8b. EMISSION ESTIMATION METHOD
Method used for determination of emission data.

Enter: 1-Source Test
2-Material Balance
3-EPA Emission Factor
4-Other Emission Factor (Specify)
5-Other (Specify)

APPENDIX C

REFERENCES

APPENDIX C

REFERENCES FOR DETERMINING PHYSICAL PROPERTIES OF PROCESS CONSTITUENTS

1. "Compilation of Air Pollutant Emission Factors." U. S. Environmental Protection Agency Document, AP-42, Supplement 8, May 1978.

2. Perry, John H., Chemical Engineers Handbook. New York: McGraw-Hill Co., 1963.

3. "Physical Properties of Common Petrochemical Compounds." American Petroleum Industry Bulletin, No. 2523, Nov. 1969, Appendix I.

4. Shreve, R. Norris, Chemical Process Industries. New York: McGraw-Hill Co., 1967.

5. Weast, Robert C., Ph.D., Handbook of Chemistry and Physics. Cleveland, Ohio, The Chemical Rubber Co., 1971.

AGENDA

1 March 1979

I. REPORT
   A. Discussion of Contents
      1. Introduction
      2. Survey Methodology
      3. Analysis of Emissions
      4. Summary of Emissions
      5. Analysis of Existing VOC Regulations
   B. Status and Time Schedule for Submission

II. EIS/P&R UPDATES
   A. Status
   B. Problems
      1. Stack Data
      2. ID Numbers
      3. Match-up with Existing Inventory
      4. Identifying Individual Sources
      5. SCC
   C. Time Schedule for Submission

III. MODIFIED EIS/P&R FOR 25-100 TPY INVENTORY
   A. Status
   B. Problems
   C. Time Schedule for Submission

IV. CDS UPDATES
   A. Status
   B. Problems
   C. Time Schedule for Submission

OUTLINE OF REPORT FOR BOSTON VOC STUDY

SOURCES OF 100 TPY OR GREATER

I. INTRODUCTION
- A. Clean Air Act Amendments of 1977
- B. National Ambient Air Quality Standards
- C. Formation of Oxidants
  - 1. Volatile Organic Compounds
  - 2. Oxides of Nitrogen
- D. Necessity for a SIP Revision
  - 1. Need for Emission Inventory
  - 2. Assistance from Engineering-Science
- E. Overview of Report Organization

II. SURVEY METHODOLOGY
- A. Identification of Potential Sources
  - 1. National Emissions Data System (NEDS)
  - 2. Compliance Data System (CDS)
  - 3. Massachusetts Department of Employment (DES)
  - 4. Dunn and Bradstreet Industrial Directory
- B. Refinement of Applicable Sources
  - 1. Permit and Registration Files
  - 2. Emissions Estimates by Number of Employees
- C. Design of Questionnaires
- D. Response and Recontacting

III. ANALYSIS OF EMISSIONS
- A. Overview of Methodology
- B. Assumptions
- C. VOC Source Categories
- D. Potential and Actual Emissions

OUTLINE OF REPORT FOR BOSTON VOC STUDY

SOURCES OF 100 TPY OR GREATER

IV. SUMMARY OF EMISSIONS

- A. Individual Sources
- B. Emissions by VOC Category

V. ANALYSIS OF EXISTING VOC REGULATIONS

- A. Control Strategies
  - 1. Positive VOC Reductions
  - 2. Solvent Substitution
    - a. Reduced Applicability
    - b. Exempt Solvents
- B. Control Technology Guidelines
- C. Boston AQCR Regulations

59